

MULTIMEDIA



UNIVERSITY

STUDENT ID NO

--	--	--	--	--	--	--	--	--	--

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2017/2018

PEM0026 – TRIGONOMETRY AND GEOMETRY (JUNE & MARCH INTAKE)

14 OCTOBER 2017
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of 6 pages including the cover page.
2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of marks for each question is given.
3. Please write all your answers in the answer booklet provided. All necessary working **MUST** be shown.
4. Only **NON-PROGRAMMABLE** calculator is allowed.

APPENDIX

TRIGONOMETRY IDENTITIES

$$\sin^2 \theta + \cos^2 \theta = 1 \quad ; \quad \sec^2 \theta = 1 + \tan^2 \theta \quad ; \quad \csc^2 \theta = 1 + \cot^2 \theta$$

$$\sin 2\theta = 2 \sin \theta \cos \theta$$

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta = 2 \cos^2 \theta - 1 = 1 - 2 \sin^2 \theta$$

$$\tan 2\theta = \frac{2 \tan \theta}{1 - \tan^2 \theta}$$

$$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$$

$$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$$

$$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \tan B}$$

$$2 \sin A \cos B = \sin(A + B) + \sin(A - B)$$

$$2 \cos A \cos B = \cos(A + B) + \cos(A - B)$$

$$2 \sin A \sin B = \cos(A - B) - \cos(A + B)$$

$$\sin A + \sin B = 2 \sin \frac{A+B}{2} \cos \frac{A-B}{2} \quad ; \quad \sin A - \sin B = 2 \cos \frac{A+B}{2} \sin \frac{A-B}{2}$$

$$\cos A + \cos B = 2 \cos \frac{A+B}{2} \cos \frac{A-B}{2} \quad ; \quad \cos A - \cos B = -2 \sin \frac{A+B}{2} \sin \frac{A-B}{2}$$

$$\sin^2 \frac{A}{2} = \frac{1 - \cos A}{2} \quad ; \quad \cos^2 \frac{A}{2} = \frac{1 + \cos A}{2} \quad ; \quad \tan^2 \frac{A}{2} = \frac{1 - \cos A}{1 + \cos A}$$

$$\sin \frac{A}{2} = \pm \sqrt{\frac{1 - \cos A}{2}} \quad ; \quad \cos \frac{A}{2} = \pm \sqrt{\frac{1 + \cos A}{2}} \quad ; \quad \tan \frac{A}{2} = \pm \sqrt{\frac{1 - \cos A}{1 + \cos A}} = \frac{1 - \cos A}{\sin A} = \frac{\sin A}{1 + \cos A}$$

Continued...

QUESTION 1 (25 MARKS)

(a) Convert the following degree measure to radian measure.

Use the value of π found on your calculator.

i. $-13^\circ 49'$ (2 marks)

ii. $-55^\circ 20' 54''$ (2 marks)

(b) Given the function $f(x) = 2 + 3\cos(2\pi x - 3)$.

i. Find the amplitude, period, and phase shift of the function $f(x)$. (5 marks)

ii. Find the maximum and minimum values of the function $f(x)$. (5 marks)

(c) If $\cot \theta = 7$, show that $\cot \theta + 2\cot(\theta + \pi) + 5\cot(\theta + 2\pi) = 56$. (4 marks)

(d) ABC is a triangle with $a = 4.15$ m, $c = 5.68$ m and $B = 27.8^\circ$.

Determine the remaining sides and angles of the triangle ABC using

the law of sines and the law of cosines. (7 marks)

Continued...

QUESTION 2 (25 MARKS)

(a) Given that $\tan \theta > 0$ and $\csc \theta = -\frac{6}{5}$, show that $\cos \frac{\theta}{2} = -\frac{\sqrt{18-3\sqrt{11}}}{6}$. (6 marks)

(b) If $\cos \theta = \frac{1}{3}$, θ in quadrant IV, find the exact value of $\tan\left(\theta + \frac{\pi}{4}\right)$. (4 marks)

(c) Find all real numbers of θ , in terms of π , that satisfy the equation $\cot \theta = 2 \cos \theta$ in the interval of $[0, 2\pi)$. (6 marks)

(d) Prove the identity $\frac{1 - \sin \theta}{1 + \sin \theta} = (\tan \theta - \sec \theta)^2$. (9 marks)

Continued...

QUESTION 3 (25 MARKS)

- (a) Transform the polar equation $r = -5 \cos \theta + \frac{2}{r}$ into rectangular equation in the form of $(x + a)^2 + (y + b)^2 = c$.

(6 marks)

- (b) Find the complex cube roots of $\sqrt{5} - \sqrt{6} i$. Express the answers in polar form, with argument θ in degrees $(0^\circ \leq \theta < 360^\circ)$.

(9 marks)

- (c) Given vectors $u = 7i + 5j - 3k$ and $v = -3i - 3j - 2k$. Find the cross product $u \times v$ and determine the angle between vectors u and v .

(10 marks)

Continued...

QUESTION 4 (25 MARKS)

- (a) Find an equation of a parabola which satisfies the given conditions:

Focus is located at $(-\sqrt{5}, 0)$; Equation of directrix: $x = 3\sqrt{5}$

(5 marks)

- (b) Given an equation of circle $x^2 + y^2 + 6x - 18y + 41 = 0$.

Find the center and radius of the circle.

(6 marks)

- (c) Determine the vertices, foci and equation of asymptotes of the given hyperbola.

$$11x^2 - 33y^2 = 99$$

(6 marks)

- (d) Find the center, vertices and foci of the conic section with the equation

$$5(x+8)^2 + 2(y-2)^2 = 10. \text{ Sketch the graph of the conic section.}$$

(8 marks)

End of Paper